Module 8: What Does the Data Show?

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Grade Two Mathematics: Module 8

What Does the Data Show?

Learning
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Grade Two Mathematics
Module 8: What Does the Data Show?
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Students	✓
Teachers	✓
Administrators	
Home Instructor	✓
General Public	
Other	

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- Alberta Learning, **http://www.learning.gov.ab.ca**
- Learning Technologies Branch, **http://www.learning.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.learning.gov.ab.ca**

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Welcome
to Grade Two Mathematics

Have you ever shared a cookie with a friend? Did you try to break it evenly so that you each got the same amount of cookie? Have you tried to figure out how tall you are? Can you tell how much time you have to do something? How much does something weigh? In Grade Two Mathematics, you will learn how to do these activities.

Look at the picture on this page. It gives the title of the Student Module Booklets you will be using. You are now using Module 8: What Does the Data Show?

Module 6
Measure It

Module 3
Having Fun
Adding and
Subtracting

Module 7
Numbers
Big and Small

Module 1
Having Fun
with Numbers

Module 4
Super Shapes

Module 8
What Does the
Data Show?

Module 2
Working with
Big Numbers

Module 5
It's About Time
—and Patterns, Too

Module 9
Fun with
Fractions

Contents

What Does the Data Show?

Have you ever wondered what kind of pets most children have? What are your friends' favourite books? What flavour of ice cream do people like best? What provinces have your friends visited?

Do you know what a graph is? Do you know how to graph the temperature over a month?

There are many fascinating things you can learn about your friends and family and the world around you. All you have to do to find out about them is ask, count, measure, or experiment. You will learn how to do just that in the next few weeks! You will also learn how to make lists, charts, and graphs of all the information you have collected. You will have fun collecting, recording, and presenting exciting new things!

Measuring Length

Object	Length							
pencil								
eraser								
paper clip								
crayon								

Day 1: Looking Back

It is time to review Module 6. In that module, you measured all sorts of things using different types of units.

Do you recall how long a decimetre is? How does it compare to a metre?

What does a thermometer measure?
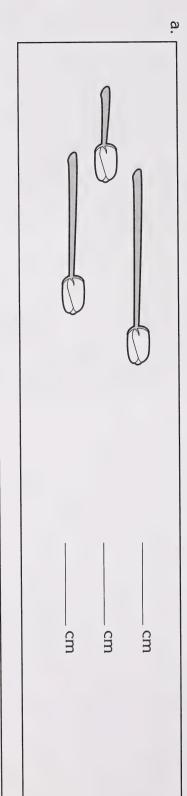
Last of all, you practised using money.
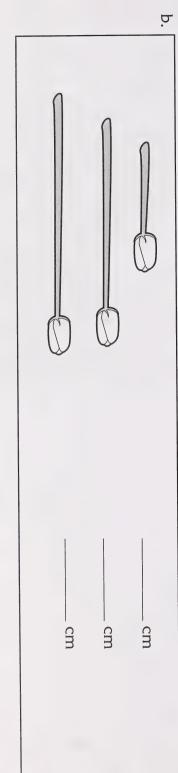
Can you remember how to count money using coins such as quarters, nickels, and dimes? You would probably agree that counting your money is an important skill to have.

Looking Back

See how well you remember what you learned in Module 6.
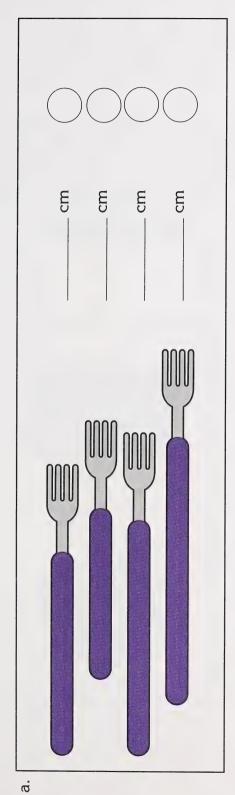
1. Measure each of these tulips and print the answer on the lines. Colour the shortest one purple. Put an X on the longest tulip.

a.

_____ cm

_____ cm

_____ cm

b.

_____ cm

_____ cm

_____ cm
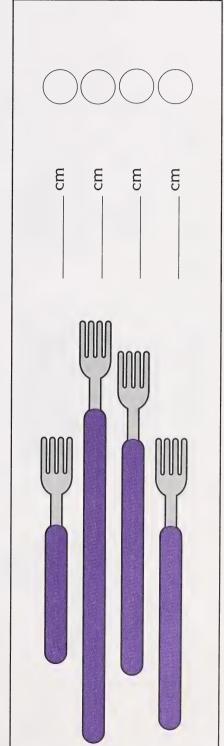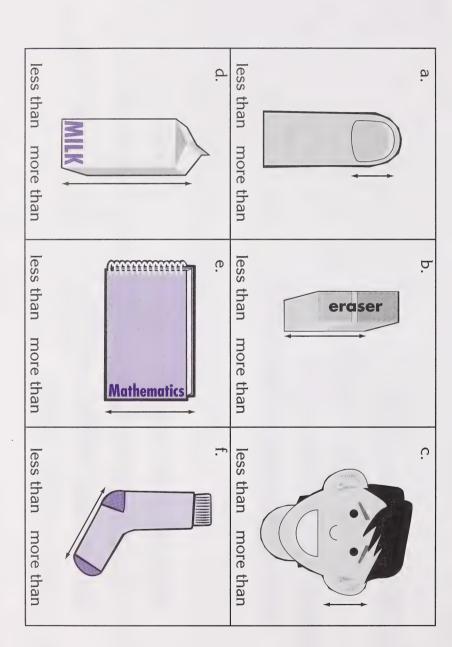
2. Measure the length of each fork and print the answer on the line. Order them from shortest to longest. The shortest one will be number one.

a.

○ ○ ○ ○

_____ cm

_____ cm

_____ cm

_____ cm

b.

○ ○ ○ ○

_____ cm

_____ cm

_____ cm

_____ cm
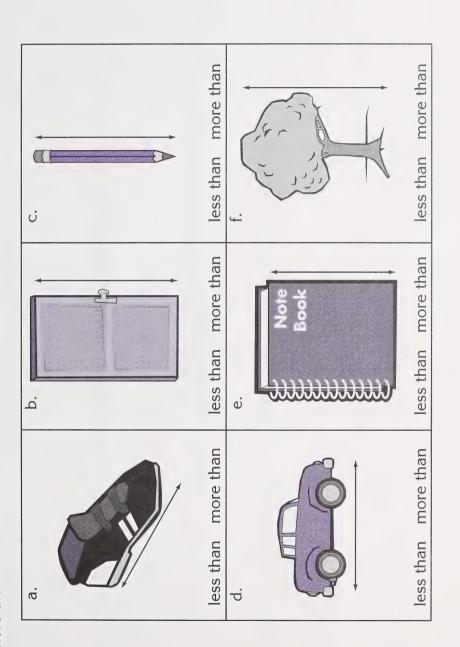
3. Look at the drawings. Think of each real item. Is it more than a decimetre or less than a decimetre? Circle less than or more than in each box.

a. less than more than	b. less than more than	c. less than more than
d. less than more than	e. less than more than	f. less than more than

4. Look at the drawings. Think of each real item. Is it more than a metre or less than a metre? Circle less than or more than in each box.

a.	b.	c.
less than more than	less than more than	less than more than
d.	e.	f.
less than more than	less than more than	less than more than

Looking Back

5. Circle the unit you would use to measure each of the following.

a. the length of a car

   cm   dm   m

b. the distance around your head

   cm   dm   m

c. the width of your thumb

   cm   dm   m

d. the distance around a house

   cm   dm   m

e. the length of a crayon

   cm   dm   m

f. the length of your arm

   cm   dm   m

6. Give three examples of small objects that are heavier than larger objects.

• _____ is heavier than _____.

• _____ is heavier than _____.

• _____ is heavier than _____.

7. Will the temperature on the thermometer rise or fall? Print rise or fall on the lines.

a. If you put a thermometer into a pot of hot tea, the temperature will

_____

b. If you put a thermometer into a pail filled with snow, the temperature will

_____

c. If you put a thermometer from hot water into cold water, the temperature will

_____

d. If you put a thermometer from the refrigerator into a hot oven, the temperature will

_____

8. Look at the thermometers. Which thermometer describes each of the following temperatures? Fill in the blanks with A, B, or C.

a. Which thermometer shows where water boils? _____

b. Which thermometer shows a very warm day? _____

c. Which thermometer shows a very cold day? _____

A

Freeze

—100° C
—90
—80
—70
—60
—50
—40
—30
—20
—10
—0
—-10
—-20

B

Freeze

—100° C
—90
—80
—70
—60
—50
—40
—30
—20
—10
—0
—-10
—-20

C

Freeze

—100° C
—90
—80
—70
—60
—50
—40
—30
—20
—10
—0
—-10
—-20

9. Fill in the blanks with the correct answer.

a. one penny = _____ ¢

b. one nickel = _____ ¢

c. one dime = _____ ¢

d. one quarter = _____ ¢

e. two quarters = _____ ¢

f. one dollar = _____ pennies

g. one dollar = _____ dimes

h. one dollar = _____ nickels

i. one dollar = _____ quarters

10. Draw a set of coins to make these amounts.

a.	18¢
b.	23¢
c.	25¢

d.   41¢

e.   76¢

f.   58¢

g.   92¢

11. Print the value of each coin or bill.

a.

☐ dollar or ☐ cents

b.

☐ dollars or ☐ cents

c.

☐ dollars or ☐ cents

d.

THIS NOTE IS NOT LEGAL TENDER

CANADA

10

1

TEN • DOLLARS • DIX

10
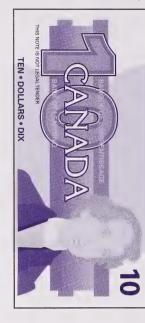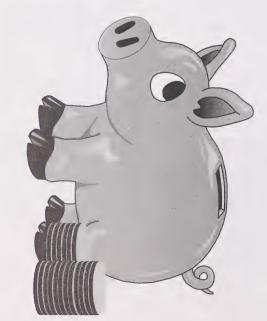
[ ] dollars or [ ] cents

Day 2: What Would You Like to Find Out?

People are all different. Finding information about people and things you are curious about can be fun and interesting.

Knowing what questions to ask is important—so is recording the answers. When you display the results, you can easily see the information that was collected.

Today you begin to learn some of the language used to describe this part of mathematics.

Lesson 1

You know how fascinating the world is around you. And you know how exciting it is to learn new things about your friends and family.

Think of all the things you would like to learn about your friends, members of your family, and the world around you. Talk about them with your home instructor. Then list them on the lines.

Things I want to know about my friends and family members

- _____
- _____
- _____
- _____
- _____

Discuss with the student how to gather information about favourite things and friends' favourite things.

What Would You Like to Find Out?

What are your favourite things? List them here.

- _____

- _____

- _____

- _____

- _____

Are there other things you want to learn about? About your family or friends? Or about the world around you? List these things here.

- _____

- _____

- _____

- _____

- _____

Lesson 2

You have done some graphing this year already, and you have done some in Grade One also. Do you remember what a graph is? Tell your home instructor what you remember about graphs.

Did you remember that a graph shows information in a simple way? Look at the graph on the next page.

Does it show information in a simple way? Circle   **Yes**   or   **No.**

Can you tell just by looking at it what it wants to show you? Circle   **Yes**   or   **No.**

Yes, you can tell just by looking at the graph what information, or data, is being presented.

Data is the word used in mathematics when you talk about information. When you want to make graphs, you use data—true information. When you see the word *data* in this module, you will know it means information.

The information in a graph also answers many questions. Take a good look at the graph on the next page.

People's Pets

Dogs	Cats

1. Answer the questions about the graph on the lines.

a. What information does the graph show you? _____

b. What pet do most of the people who were asked have? _____

c. How many people have cats? _____

d. How many people were asked about their pets? _____

You can find out many things by looking at a graph. Look at this graph.

2. Answer the questions about the graph.

Number of Children Sick in One Week

Monday	🙂 🙂 🙂 🙂
Tuesday	🙂 🙂 🙂
Wednesday	🙂 🙂 🙂
Thursday	🙂 🙂 🙂 🙂 🙂 🙂 🙂 🙂
Friday	🙂 🙂 🙂
Saturday	
Sunday	🙂

a. What information, or data, does the graph give you?

_____

_____

b. On which day were the most children sick?

_____

_____

c. On which days were the same number of children sick?

_____

_____

What Would You Like to Find Out?

d. How many children were sick on Sunday?

e. On which day were no children sick?

3. What questions can you ask about this graph? Think of six questions. Write them on the lines on the following pages.

Favourite Hobbies

Reading	Watching TV	Playing Soccer	Riding a Bike	Dancing	Playing the Violin
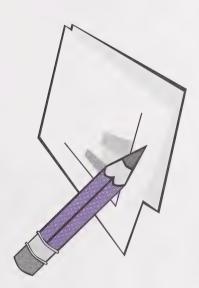
What Would You Like to Find Out?

You will be making graphs of your own. Before you learn how to make graphs, you need to collect the data and record it. You will learn how to do that in the next few days.

Go to Assignment Booklet 8A.

Day 3: Collecting Data

What is data? How do you get data?

Elena and Jasper wanted to find some information about people they knew. They thought of three ways to collect data. You will learn about those methods today.

You will also begin to collect data of your own.

Collecting Data

Lesson 1

Jasper's friend Neil had to get glasses. Jasper went with Neil to the optometrist to pick out frames. After Neil got his glasses, Jasper noticed that many other people also wore glasses. He told Elena about this. Together, they decided to find out how many people they knew wore glasses.

Elena and Jasper had to figure out how they would get the data they needed.

Brainstorm ideas for collecting data with the student. For this problem, the student can write down the names of all the people he or she knows and count how many wear glasses.

Do you have any ideas? Tell your home instructor how you think Jasper and Elena could find out about people who wear glasses.

Did you say counting the people in a group to see who wears glasses? You are right! Counting is one way of getting or collecting information.

Lesson 2

Jasper and Elena knew they had to count the people to get their data. They talked about other ways, too. They came up with three ways of collecting data. Did you think of these, too?

Counting
When you need to find out how many, you count out the number.

Measuring
Sometimes you need to measure things to get the data you want. Can you think of any data you would want to know that would need to be measured? Talk about this with your home instructor.

Survey
Sometimes you need to ask people questions to get the data you need. You may want to know what are your family and friends' favourite colours, TV shows, or sports. Are you curious about what kind of pets they have or what kind of activities they do after school? A survey is a way of finding out about people. When you ask people questions about themselves, you are taking a survey.

Brainstorm things that could be measured. These could include the height of family members and friends, their different shoe sizes, the distance they can jump, and so on.

Print the three ways of collecting data here.

- _____

- _____

- _____

Counting, measuring, and surveying are three ways of collecting data.

Lesson 3

Jasper and Elena began to make a list of all the people they knew. They soon realized, however, that they would have a list a metre long if they named all the people they knew. They decided to stop the list at ten people to make their group. This is their list. Now they could count how many people in their group wore glasses.

Beryl	Elena's mom	Jasper's dad	Lara	Jared
Elena's dad	Jasper's mom	Neil	Suki	Jonathan

Elena tried to think of what kind of data they could collect by measuring. Jasper told Elena he had big feet. He wondered how big his friends' feet were. Elena said, "Let's measure everyone's feet!" They decided to measure the feet of the people on their list.

Now that they knew what they would count and what they would measure, Jasper and Elena wondered what they could survey. Elena loved fruit. She wanted to find out what is the favourite fruit of the people in the group.

What does Elena have to do before she can survey the people on the list? Talk about this with your home instructor.

This is how Elena prepared for the survey. She got a sheet of paper and printed the question she was going to ask everyone on it. She then printed all the names of the people on the paper, and she left room beside the names for their answers. Elena was ready to begin her survey!

Discuss how Elena should prepare for the survey. She could have the question ready and printed on the page. She could print the names of the people she will question on a piece of paper, and she could leave room beside the names for their answers.

Collecting Data

Now it's your turn to find out things about the people you know. Print the names of six of your friends and family on the lines below.

_____   _____

_____   _____

_____   _____

You are going to count, measure, and survey these people to collect the data just like Elena and Jasper collected data about their friends and family.

Go to Assigment Booklet 8A.

Day 4: Count, Measure, and Survey

Do you wear glasses? Do people you know wear glasses?

How big are your feet? What kind of fruit is your favourite?

These are the questions that Jasper and Elena asked to collect their data. To get the information, they had to count, measure, and survey people.

Read on to see what they found out. How do you think your feet will compare to other people's feet?

Lesson 1

Elena and Jasper spent an entire evening counting, measuring, and surveying their friends and family members.

They first counted the people who wear glasses and those who don't. Here is their list.

Beryl	doesn't wear glasses
Neil	wears glasses
Suki	doesn't wear glasses
Lara	wears glasses
Jared	wears glasses
Jonathan	doesn't wear glasses
Elena's mom	doesn't wear glasses
Elena's dad	wears glasses
Jasper's mom	doesn't wear glasses
Jasper's dad	doesn't wear glasses

Jasper counted the number of people who wear glasses. Count them yourself and print your answers in the boxes.

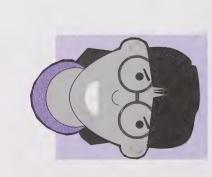How many people wear glasses? ☐

How many people don't wear glasses? ☐

Yes, four people wear glasses and six people do not wear glasses.

Count, Measure, and Survey

1. How many more people do not wear glasses than wear glasses?

   Print the equation. _____

   _____ = _____

2. [ ] more people do not wear glasses than wear glasses.

Print the names of your six friends and family members on the lines below.
Then print whether they wear glasses or not beside their names.

Name	Wears Glasses or Not?

How many people wear glasses?

How many people don't wear glasses?

Lesson 2

Next, Jasper and Elena measured feet. They only measured the right foot of the person. Do you know why they did that? Tell your home instructor.

Jasper and Elena knew they only needed to measure one foot because both feet of a person are usually the same length.

Jasper and Elena used a 30-centimetre ruler to measure the length of the feet.

Why do you think that is the best tool for measuring feet? Tell your home instructor.

Discuss how only one foot is needed for measurement because both feet of a person are usually the same length.

An average foot is less than 30 cm long.

Count, Measure, and Survey

Since most people's feet are less than 30 cm, a 30-centimetre ruler is a good tool to use. Is that what you thought as well?

This is the data Jasper and Elena collected.

Name	Length of Foot in Centimetres
Beryl	18 cm
Neil	19 cm
Suki	16 cm
Lara	13 cm
Jared	21 cm
Jonathan	20 cm
Elena's mom	23 cm
Elena's dad	29 cm
Jasper's mom	26 cm
Jasper's dad	30 cm

Who has the biggest foot?

_____

How big is it? [   ] cm
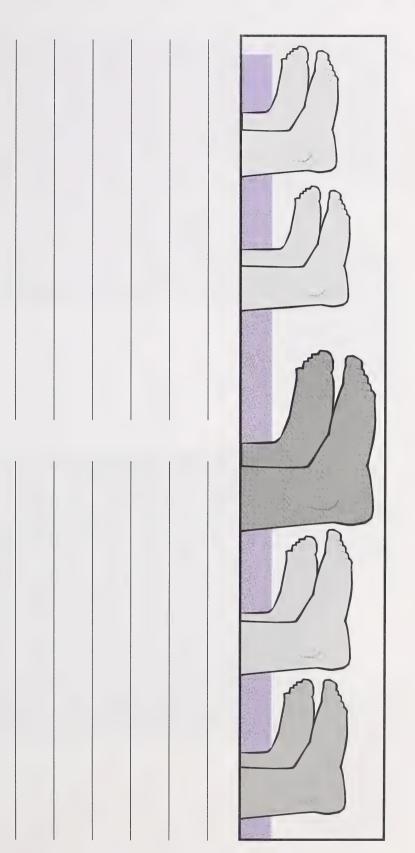
Who has the smallest foot?

_____

How big is it? [   ] cm

Count, Measure, and Survey

Print the names of your six friends and family members on the lines below. Then print their foot measurements on the lines beside their names. Remember to print cm after each number.

Name   Length of Foot in Centimetres

Lesson 3

Elena surveyed her friends and family members about their favourite fruit. This is the data she collected.

Name	Favourite Fruit
Beryl	apple
Neil	orange
Suki	banana
Lara	pear
Jared	apple
Jonathan	apple
Elena's mom	banana
Elena's dad	orange
Jasper's mom	apple
Jasper's dad	banana

Count, Measure, and Survey

Print the names of your friends and family members on the lines below. Then print their favourite fruit on the line beside their name.

Name	Favourite Fruit

Count, Measure, and Survey

You have now collected data by counting, measuring, and surveying.

Go back to Day 2, Lesson 1. Look at the three lists you made of things you wanted to know about friends and family, favourite things, and other things you wanted to learn about. From these lists, select one item you can collect data for by counting, measuring, and surveying. Print them on the lines.

I can collect data to learn about
_____
by counting.

I can collect data to learn about
_____
by measuring.

I can collect data to learn about
_____
by surveying.

Day 5: Recording Data

Just as there are different ways to gather data, there are different ways to record it.

What might those be? Can you guess?

Now is the time to discover how data can be recorded. Turn the page to see what Jasper and Elena did with the information they found.
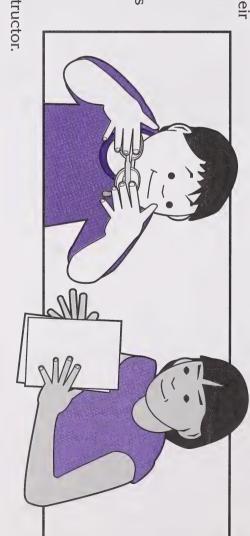
Lesson 1

Jasper and Elena have collected their data. Now they are ready to keep a record of it.

Jasper and Elena counted the number of people who wore glasses and those who didn't wear glasses. Now they had to figure out how to record that data.

How do you think they should do that? Discuss it with your home instructor.

Here are three ways to record data—make a list, make a chart, and draw a picture. Did you think of these ways, too?

Print the three ways you've learned to record data.

_____

_____

_____

Lesson 2

Jasper and Elena made a list of ten people they knew. Then, they recorded the data they had beside each name on the list. This is the same list they made when they collected the data. When you collect data, you usually make a list.

This is what their list looked like.

Beryl	doesn't wear glasses
Neil	wears glasses
Suki	doesn't wear glasses
Lara	wears glasses
Jared	wears glasses
Jonathan	doesn't wear glasses
Elena's mom	doesn't wear glasses
Elena's dad	wears glasses
Jasper's mom	doesn't wear glasses
Jasper's dad	doesn't wear glasses

In the list, the data is printed beside the names.

Lesson 3

Jasper wanted to record the data another way. He decided to record the data on a chart like this.

Names	Wears Glasses	Doesn't Wear Glasses
Beryl		✓
Neil	✓	
Suki		✓
Lara	✓	
Jared	✓	
Jonathan		✓
Elena's mom		✓
Elena's dad	✓	
Jasper's mom		✓
Jasper's dad		✓

The chart is a little different from the list. How is it different? Tell your home instructor.

In the chart, data is checked off and arranged in a different format. In this case, it is in table format.
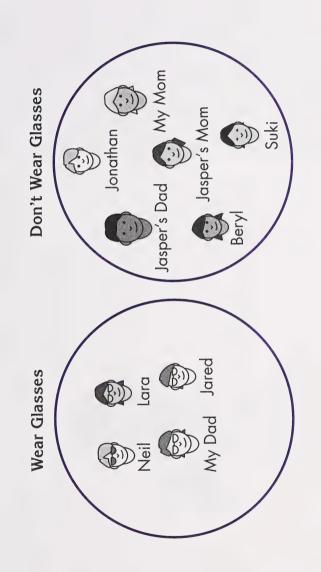
The chart has the data checked off beside the names. In the list, the data is written down.

Lesson 4

Do you remember the third way of recording information? What is it? _____

Drawing a picture is correct. Elena made a picture of her information. She drew two circles and sorted the information. Her sorting rule was people who wear glasses and people who don't wear glasses. This is her picture.

Wear Glasses

Neil

Lara

My Dad

Jared

Don't Wear Glasses

Jonathan

Jasper's Dad

My Mom

Jasper's Mom

Beryl

Suki

Discuss with the student the three ways of recording data and which one they prefer for this particular problem.

Elena liked the chart best for recording the information. Jasper liked the picture best. Which do you prefer? Tell your home instructor which you prefer and why.

You have already recorded the data you collected on a list. You printed the names and beside each name you printed, "wears glasses" or "doesn't wear glasses."

It's your turn to record the data on a chart. Use your list from Day 4, Lesson 1 and make your chart.

Recording Data

Begin by printing the names of your friends and family members in the first column. Then make a check mark beside each person under the column "Wears Glasses," or "Doesn't Wear Glasses," just like Jasper did in his chart in Lesson 3.

Names	Wears Glasses	Doesn't Wear Glasses

You have recorded your data on a list and on a chart. What other way can you record your data?

_____

If you said draw a picture, you are right!

Draw a picture of the people with glasses and the people without glasses, just like Elena did in Lesson 4. Sort the information.

What is your sorting rule? _____

_____

Go to Assignment Booklet 8A.

Day 6: Making Graphs

Look again at today's title. You have already done some work with graphs. Graphs are an interesting way to present information.

Looking at a graph is often easier than reading to find information. It is often faster, too!

There are different types of graphs for presenting different types of information.

Let's see how Elena and Jasper used graphs to present their information.
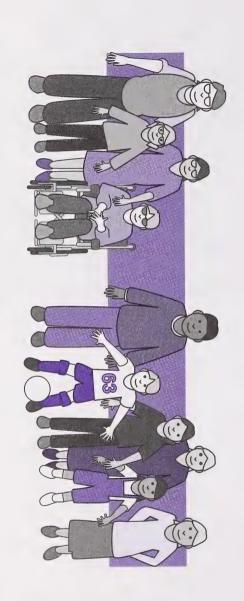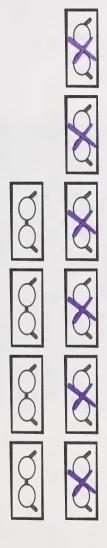
Then you can use a graph for your information.

Lesson 1

Now that Jasper and Elena had collected and recorded the data, they wanted to present it. Elena remembered working with graphs from Grade One. Jasper couldn't remember all the graphs. Elena reminded Jasper of the three kinds of graphs they had worked with before.
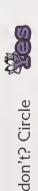
She told him they could bring the people in and line them up in rows. One row would have the people who wear glasses, and the other row would have the people who don't wear glasses. This is an **object graph**. That means the actual object is shown. They both decided this wasn't the best way to show their data. It would be too hard to get all the people together at one time.

Elena said another kind of graph is a **picture graph**. This is where pictures of the objects are put into rows. Jasper thought that would be a good way of showing their data. He drew glasses on cards to show the people who wore glasses, and he put an ✘ on the cards with glasses to show the people who didn't wear glasses. This is what his picture graph looked like.

Look at the picture graph. Can you tell just by looking at it how many people wear glasses and how many don't? Circle   **Yes**   or   **No** .

Can you tell right away if more people wear glasses, or if more people don't wear glasses?

Circle   **Yes**   or   **No** .

Yes, a picture graph gives you data at a glance.

Elena talked about the third kind of graph—a bar graph. On this graph, a square is filled in for each item.
Elena made this bar graph to show their data.

Glasses or No Glasses

Wear Glasses	Don't Wear Glasses

Look at the bar graph. Can you tell just by looking at it how many people wear glasses and how many don't? Circle **Yes** or **No**.

Making Graphs

Can you tell right away if more people wear glasses, or if more people don't wear glasses?

Circle Yes or No .

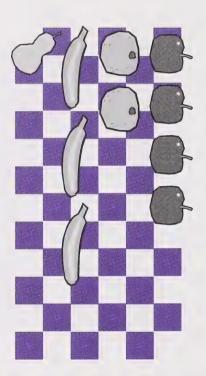Yes, a bar graph gives you data at a glance.

Print the three different kinds of graphs you learned.

_____

_____

_____

Lesson 2

Elena and Jasper had so much fun making graphs of their data that they decided to make more graphs. They thought it would be fun to make graphs of the data collected in the favourite fruit survey. The first graph they made was an object graph.

Making Graphs

The first thing Elena did was sort the fruit that everyone chose. She arranged the fruit on a table in rows to look like this.

1. Answer these questions about the data on the lines.

a. What data does the graph give you? _____

b. How many people prefer oranges? ☐

c. What is the most popular favourite fruit? _____

Making Graphs

Then Jasper made a picture graph of the data that looked like this.

2. Answer these questions about the data.

a. What is the least popular favourite fruit?

_____

b. How many more people like bananas than pears? Print the equation.

_____ = [ ] more people like bananas than pears.

Finally, they made a bar graph.

3. Answer these questions about the data on the lines.

Favourite Fruit

apple									
orange									
banana									
pear									

a. How many people prefer pears? ☐

b. How many more people like apples than oranges?
Print the equation.

_____ ☐ = ☐ more people like apples than oranges.

c. How many people were surveyed for the graph? ☐

Show your work here. _____

Lesson 3

Now it's your turn to show the data you collected and recorded. Use the data you got from your survey in Day 4, Lesson 3 that shows the favourite fruits of your friends and family members. If you can, make an object graph of the data. How do you think you would do that? Tell your home instructor.

Look at your data and make an object graph by placing the fruit on a table or desk. If you don't have the fruit, draw and colour each fruit on a separate piece of paper. Then arrange the fruit or the fruit pictures in rows on the table top.

Once you have arranged the fruit in rows, you should be able to see right away how many of each fruit was chosen.
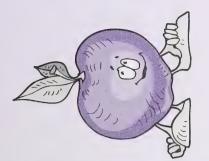
Answer these questions about the data.

What data does the graph give you? _____

What is the favourite fruit? _____

How many people were surveyed for the graph?

On a table top, the student will arrange the fruit that was chosen for the survey. If this is not possible, have the student draw and colour each fruit on a separate piece of paper. Then the student can arrange the fruit in rows.

Making Graphs

Make a picture graph of the data, just like Jasper did. Draw the fruit in the box below.

Answer these questions about the data.

What is the least favourite fruit? _____
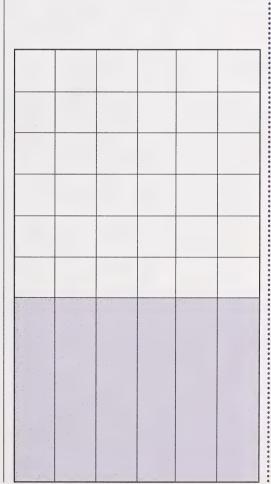
How many different fruits are shown? [ ]

Discuss with the student why the graph would change if other people were surveyed. The data would be different because the people surveyed are different. Different people have different preferences.

Day 6

Do you think the graph will be the same if you surveyed different friends and family members about their favourite fruits?

Circle **Yes** or **No** .

Why or why not? Tell your home instructor.
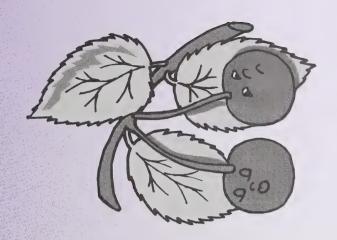
Make a bar graph like Elena and Jasper to show your data. Remember to put a title above the graph and to fill in the names of the fruit.

Making Graphs

Have the student look at the questions asked about the previous graph to help make his or her questions.

Think of three questions you could ask someone about the graph and print them on the lines.

- _____

- _____

- _____

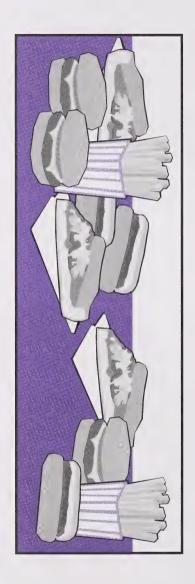For more practice making graphs, go to the Extention Activities.

Go to Assignment Booklet 8A.

Jasper's friend Josh showed everyone a new, quick way to record and show data. Jasper used it to help plan a party.

Elena's friend belongs to a club. The club used this method to record a vote they took.

Collecting data can be very useful.

See what tally marks are all about. Then you can decide which method of showing data you like best.

Lesson 1

Jasper and his friends were having a party. Their parents wanted to know everyone's favourite fast food, so they could order it in. Jasper and his friends thought it would be fun to graph the data they collected.

Jasper knew the first thing they had to do was collect the data. He decided to make a list of his friends' favourite fast food. Jasper started to make a list of his friend's names. Jasper and his friends soon saw that making a list was taking a long time, and it wasn't the best way to collect this data. There were so many people to ask.

Jasper's friend Josh said they could use a tally to help them.

Jasper wondered what a tally was. Do you know? Tell your home instructor if you do.

A tally is an easy and useful way of recording data. It's used when you take a survey.

Tallyho

Josh showed everyone how to make a tally. The first thing he did was print the names of the fast foods on a piece of paper. This is what it looked like.
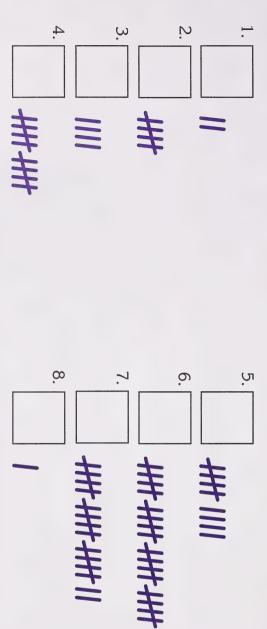
Favourite Fast Food

hot dog	
hamburger	
fried chicken	
pizza	
submarine	
taco	

After Josh listed the fast foods, he asked his friends to raise a hand when he read the name of their favourite fast food. When he said hamburger, eight children raised their hands. Jasper helped Josh make the tally marks. He put one tally mark for each hand he saw.

These are the tally marks Jasper made: 卌 ///. He put a mark through the first four to make five tally marks. He did this, so it would be easy to count the tally marks in groups of five.

Tallyho

Print in the box the number that the tally marks show.

1. [ ] ||

2. [ ]   ⊬⊦⊦

3. [ ] ||||

4. [ ]   ⊬⊦⊦ ⊬⊦⊦

5. [ ]   ⊬⊦⊦ ||||

6. [ ]   ⊬⊦⊦ ⊬⊦⊦ ⊬⊦⊦

7. [ ]   ⊬⊦⊦ ⊬⊦⊦ ⊬⊦⊦ ⊬⊦⊦ ||

8. [ ] |

Jasper and his friends saw how easy it was to record data with tally marks.

62

Lesson 2

Josh was ready to record everyone's favourite fast food. These are the results.

Favourite Fast Food

hot dog	‖‖‖ ‖‖‖ ‖
hamburger	‖‖‖ ‖‖‖
fried chicken	‖‖‖
pizza	‖‖‖ ‖‖‖ ‖‖‖ ‖
submarine	‖‖‖ ‖
taco	‖‖‖

Josh gave this data to the parents who had asked for it. What do you think the parents will do with the data? Tell your home instructor.

There is always a reason for collecting, recording, and presenting data. Jasper's friends were having a party. The parents wanted to know how much food they had to buy for the party. Getting this data was very useful to them. The data told them how much food and what kind to buy for the party.

Discuss the importance of data: the reasons for collecting it and what can be done with it once it has been recorded. In this case, the data showed the parents how much and what kind of food to buy.

1. Answer these questions about the data. Print your answers on the lines.

a. What does the data tell you? _____

b. What is the favourite fast food? _____

c. How many children like fried chicken? ☐   d. How many children like tacos best? ☐

e. How many more children like hot dogs than submarines? Print the equation.

_____ = _____

☐ more children prefer hot dogs than submarines.

f. What is the least favourite fast food? _____

How do you know that? _____

g. What can be done with this data? _____
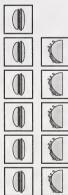
After Jasper and his friends recorded the data, they decided to present it on a graph. Jasper made a picture graph.

Favourite Fast Food

Jasper's friend Monique made a bar graph using the data they collected.

Favourite Fast Foods

hot dog															
hamburger															
fried chicken															
pizza															
submarine															
taco															

Look at the tally Josh made, the picture graph Jasper made, and the bar graph Monique made. Which way of showing data do you like best? _____

Why? _____

Discuss the three ways of showing data. Have the student tell you why he or she prefers one way over the others.

Elena's friend Lola belongs to a bird club. They like to watch birds. Lola told Elena her group voted for a club president. Lola did the recording of votes for the club. She showed Elena her data. This is how Lola recorded the votes.

Votes for Club President

Nahib	|||
Ashley	##### ||
Selene	||
Emil	##### ||||
Juan		
David	#####	
Michael	|||

How did Lola record the data? _____

Did you say with a tally? You are right!

2. Make the graph using the data from the tally. Remember to print a title for the graph.

Nahib	Ashley	Selene	Emil	Juan	David	Michael

3. Print below five things you learned from the graph.

• _____

• _____

• _____

• _____

• _____

Go to Assignment Booklet 8A.
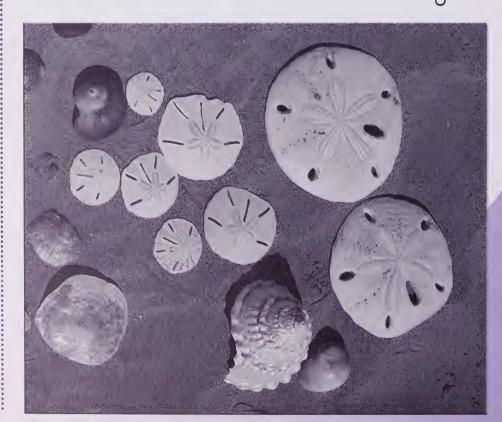
Note: On Day 11 you will be making graphs from data you collect. Start preparing for it now. Look at the list you made in Day 2, Lesson 1 of things you wanted to learn about friends and family members and other things around you. Start collecting data by counting, measuring, or surveying. Be sure to have this data ready for Day 11.

Day 8: Fun with Graphs

Now that you know how to use tally marks, you can help Elena and Jasper do some graphing. They need help putting their information into graphs.

You will use many of your math skills to help them make graphs about sea shells, books, birds, and other animals.

After helping them, you will be ready to make your own graphs.

Fun with Graphs
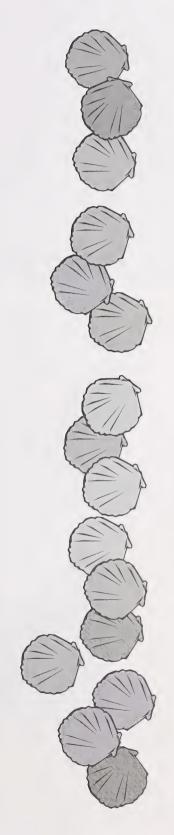
Lesson 1

Elena wanted to find out how many shells her friends collected at the beach. She took a survey of her friends, and this is what she found out.

Names	Shells Collected
Sandi	13 shells
Marty	9 shells
Mitali	22 shells
Taylor	17 shells

Fun with Graphs
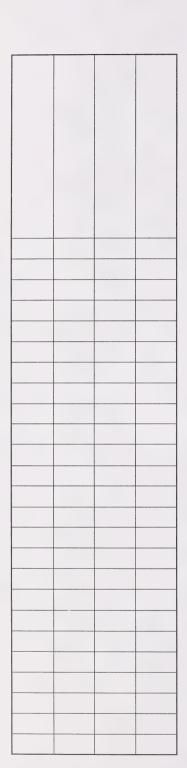
1. Elena wanted to show this data with a tally. She did the first one. You do the rest.

Sandi |||| |||| |||
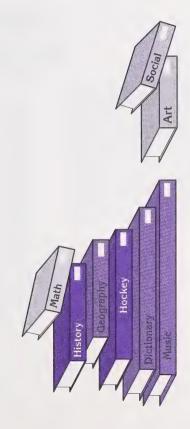
a. Marty

b. Mitali

c. Taylor

2. Make a bar graph to show the data. Remember to print a title for your graph and to print the names of the children in the graph.

Fun with Graphs

Lesson 2
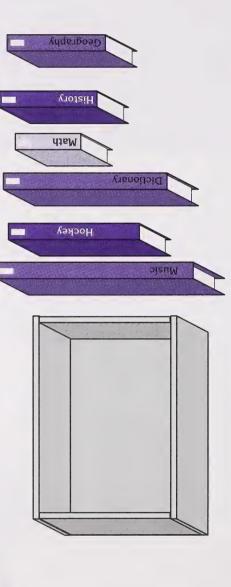
Jasper loves to read. Sometimes, though, he forgets to put his books away. His father asked him to put all his books on the shelf. Jasper found that some of the books didn't fit on the shelf. He decided to measure them all to see which ones would fit.

Use a ruler to measure Jasper's books. Some are taller than his bookshelf, some are the same height, and some are shorter.

1. On the lines below, print the names of the books here that are taller, shorter, or the same height as the bookshelf.

a. taller

b. same

c. shorter

_____

_____

_____

_____

_____

_____

2. Make a picture graph of the data.

taller

same

shorter

3. Make a bar graph of the data. Print the title of the graph.

taller					
same					
shorter					

Lesson 3

Elena thought she would ask Lola if she could join her bird club. Elena liked birds and wanted to find out more about them. Lola told Elena to watch for different birds and report what she saw to the club.

Fun with Graphs
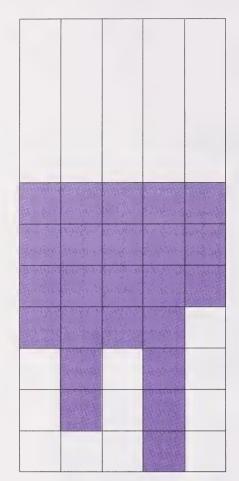
1. a. The birds Elena saw were chickadees, redpolls, juncos, bluejays, and magpies. Elena made a graph of the birds to include in her report to the club. Can you help her fill in the names of the birds using the data below?

The birds she saw the most were chickadees.

The birds she saw the least were bluejays.

She saw the same number of juncos as she did redpolls.

Birds I Saw

b. What kind of graph is this? _____

Fun with Graphs
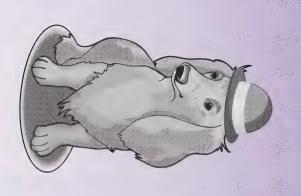
Lesson 4

Jasper took a survey of the kind of pets his friends had. He found out that all of his friends had pets. Five had dogs, seven had cats, three had fish, and two had birds. He then made a picture graph with the data.

1. Help Jasper with his picture graph. Label the graph and then draw in the pets using the data above.

Answer the questions the student has written for you.

2. Think of three questions about the graph you made with Jasper's data and print them on the lines. Ask your home instructor to answer the questions.

• _____

_____

• _____

_____

• _____

_____

3. a. How many more children have fish than birds?

Print the equation. _____

b. How many more children have cats than dogs?

Print the equation. _____

c. Do you think the graph will be the same if Elena asked her friends what pets they have?

Circle **yes** or **no** .
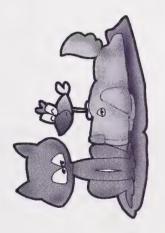
Why or why not? _____

_____

_____

Have you been collecting data for the activities coming up in Day 11? Keep at it. You will be making several graphs, so make sure you have enough data collected.

Day 9: Shake It Out

Have you ever played heads or tails with a coin? Do you know how that game works?

You will try some mathematical experiments like that today.
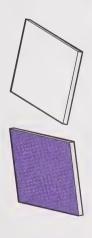
When you have collected your data from these games, you will present it as a graph.

Let the games begin! Shake it out!

Lesson 1

Jasper and Elena were doing a mathematical experiment. They each took turns shaking and spilling a pair of coloured counters. Each counter had two sides to it. One side was purple, and the other side was white.

They recorded how the counters landed after each shake and spill. They recorded P for purple and W for white. If the counters both turned up with purple sides showing, they printed PP (purple/purple). If the counters both turned up with white sides showing, they printed WW (white/white). If the counters turned up different—one with a purple side showing and the other one showing white, they printed PW (purple/white). Here are their results:

PP	WW	PW	PW	PW
PW	WW	WW	PW	PW
PW	PW	WW	PP	WW	PP
PP	PP	PW	WW	PW	PP

Ensure the student understands the coding of the colours.

Now that Jasper and Elena had collected the data, they decided to record it on a chart.

purple/purple	✓	✓	✓	✓	✓	✓	✓			
white/white	✓	✓	✓	✓	✓	✓				
purple/white	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Select two coins of the same value from your Math Box. You will also need a small box or plastic container.

You can try a similar mathematical experiment. You're going to play Heads or Tails with your two coins. Place the two coins in the container and shake and spill them onto your desk. Keep a record of how the coins land after each shake. If a coin lands with the face showing, mark **H** for heads. If a coin lands with the other side showing, mark **T** for tails.

The student will need a small plastic container or box to shake the coins in. Explain to the student that *heads* means the side of the coin with the face on it, and *tails* means the other side of the coin. Go over the instructions to ensure the student understands how to record each coin toss.

Shake It Out

Shake and spill the coins 20 times. If the two coins land showing heads and heads, print **HH**. If the two coins land showing tails and tails, print **TT**. If the coins land heads and tails, print **HT**. Print the results of each shake on the lines below.

_____   _____   _____

_____   _____   _____

_____   _____   _____

_____   _____   _____

Now record the data you collected on the chart, just as Elena and Jasper did.

Check that the student fills in the appropriate boxes and fills heads/heads, tails/tails, and heads/tails on the chart.

Shake It Out

What have you found out?

Lesson 2

Take one die out of your Math Box.
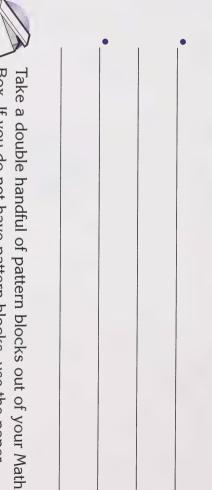
Roll the die 30 times. Keep a tally of the rolls in the box beside the number on the die.

Number	Number of Times It Came Up
1	
2	
3	
4	
5	
6	

1. Now make a bar graph for your experiment. Print the title and the numbers of the die.

What number was rolled the most? ☐
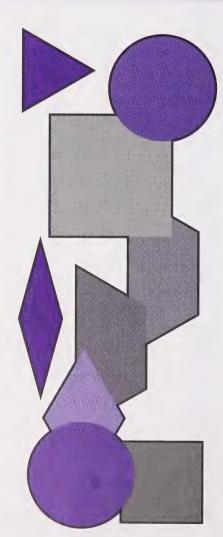
What number was rolled the least? ☐

2. What are two other questions you can ask about this graph?

• _____

_____

• _____

_____

Take a double handful of pattern blocks out of your Math Box. If you do not have pattern blocks, use the paper ones in your Student Folder.

Have the student get about 20 different pattern blocks from the Math Box or the different-sized, 2-D pattern block shapes from the Student Folder. The student should sort these by number of sides or no sides (the circles).

Look at your pattern shapes. How can you sort these to show groups of shapes with the same number of sides? Tell your home instructor.

Did you say sort the shapes into groups of no sides for the circles, three sides for the triangles, and four sides for the squares and rectangles? You are right if you did.

3. Make a picture graph, so you can compare the number of shapes in each group. Remember to give the graph a title.

Do you have to count the shapes to know which group has the most?

Circle **yes** or **no**.

Why or why not? Tell your home instructor.

You don't have to count the shapes because the graph shows you right away which group has the most. The row with the most squares filled in has the most.

Go to Assignment Booklet 8A.

Have you been collecting data for Day 11? Keep at it.

It isn't necessary to count the shapes on the graph because all you have to do is look at it to know which has the most; the row with the most squares filled in has the most.

Day 10: What Do the Graphs Say?

A graph can give you a lot of information at a glance. Have you ever heard someone say that a picture is worth a thousand words? A graph is a kind of picture.

Along with Jasper and Elena, you will explore the wonderful world of information in graphs.

You may just be surprised how much a graph can tell you.

Lesson 1

Jasper and Elena found a graph made by Sheila in a mathematical book. They studied it to find out what kind of information they could learn from it. This is the graph.

Our Stickers

Sheila	Cornell	Ivan	Brent	Anna	Maria

1. Study the graph and then answer the questions.

a. What do you think Sheila wanted to learn when she made this graph? _____

_____

b. Who had the most stickers? _____

c. Who had the least stickers? _____

d. How many more stickers does Anna have than Ivan?

e. Who has more stickers, Cornell or Sheila? _____

How do you know? _____

_____

e. Who has more stickers, Cornell or Sheila? _____

How do you know? _____

f. How many people did Sheila survey?

g. How many were girls?

h. How many were boys?

i. Will Sheila's graph look the same if she gathers her information tomorrow or next week?

Circle **yes** or **no**.
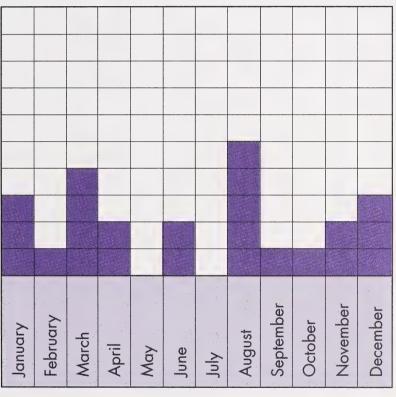
Explain why or why not. _____

_____

Jasper and Elena found they could get a lot of information from a graph.

_____

What Do the Graphs Say?

See how much you can find out from Tami's graph.

Birthdays in My Scout Group

	1	2	3	4	5	6	7	8	9	10
January										
February										
March										
April										
May										
June										
July										
August										
September										
October										
November										
December										

2. Answer the following questions by printing your answers on the lines.

a. What does this graph show? _____

b. Which month has the most birthdays? _____

c. Which months have no birthdays? _____

d. How many children were surveyed?

e. If you surveyed Steve's scout group, would the graph look the same? Circle 🐜**Yes** or 🐜**No**.

Why not or why not? _____

3. Think of three other questions you can ask about this graph. Have your home instructor answer your questions.

- _____
- _____
- _____

Lesson 2

Many of Jasper and Elena's friends go to the school in their town. Jasper wanted to know how they got to school. He and Elena took a survey. This is what they found.

Larissa—bus

Anita—bike

Tom—walk

Stanley—walk

Jenna—car

Doug—bike

Hillary—bus

Christine—walk

Nita—bus

Lionel—walk

Omar—car

Taisa—bike

Ben—bus

Carrie—bus

Amanda—bus

Eddie—walk

1. Make a chart for the data. Fill in the numbers in each column.

Bus	Walk	Car	Bike

2. Make a bar graph using the data. Print a title and the names of the ways the children get to school.

3. Print six questions about the graph. Have your home instructor answer the questions.

* _____

_____

* _____

_____

* _____

_____

* _____

_____

* _____

_____

* _____

_____

Go to Assignment Booklet 8B.

Day 11: I Can Make Graphs

You have been collecting data for a few days now. You have also helped Elena and Jasper make graphs with their data.

Today's title tells what you are now ready to do.
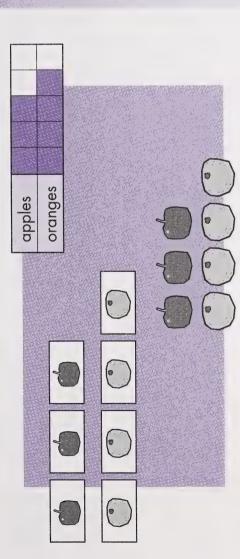
How many types of graphs are there? What are they? Which kind would you like to make?

You will have a chance to make different types of graphs with your data.

I Can Make Graphs

Now it's your turn to make graphs from the data you collected. You should have collected enough data to make several graphs. Here are three examples of different graphs all using the same data.

apples					
oranges					

What is your first graph going to be about?

Guide the student through the questions.

How did you collect the data for it? Underline one.

counting   measuring   surveying

Assist the student with recording the data and making the graph. If the student is making an object graph, have him or her arrange the items on a table, then draw them in the graph box.

How will you record the data? Underline one.

chart   list   picture

Record the data for your first graph here. Make a chart, a list, or draw a picture. You'll use this data to make your graph.

I Can Make Graphs

What kind of graph will you use? Underline one.

    object graph   picture graph   bar graph

Take graph paper from your Student Folder.

Make your graph. Remember to give it a title.

What are four questions you could ask your home instructor about the information you got?

• _____

• _____

• _____

• _____

I Can Make Graphs

What is your second graph going to be about?

How did you collect the data for it? Remember to make it different from your first one. Underline one.

counting   measuring   surveying

How will you record the data? Make it different from your first one. Underline one.

chart   list   picture

Record the data for your second graph here. Record it in a different way from the way you did for the first graph. For example, if you made a chart for your first graph, make a list or draw a picture for this one.

I Can Make Graphs

What kind of graph will you use? Make it different from your first one. Underline one.

object graph   picture graph   bar graph

Take graph paper from you Student Folder.

Make your second graph. This time, make it different from your first one.

What are four questions you could ask your home instructor about the information you got?

• _____

• _____

• _____

• _____

What is your third graph going to be about?

How did you collect the data for it? Remember to make it different from the other two. Underline one.

counting   measuring   surveying

How will you record the data? Make it different from the other two. Underline one.

chart   list   picture

Record the data for your third graph here. Remember to record it in a different way from the way you did for the other two graphs.

I Can Make Graphs

What kind of graph will you use? Make it different from the other two. Underline one.

object graph   picture graph   bar graph

Take graph paper from your Student Folder.

Make your third graph. Remember to make it different from your other two.

What are four questions you could ask your home instructor about the information you got?

- _____
- _____
- _____
- _____

Did you ever think of a menu as being full of data?

A menu includes delicious data! It can help you solve some important problems.

Elena and her cousins have only so much money to spend. They need a menu to see what they can buy for a snack.

Let's see what other problems can be solved by looking at the data.

Using Data to Solve Problems

Lesson 1

Elena and her cousins Selene and Dennis were shopping at the mall. They stopped at a café for a snack. Selene had 145¢ to spend, Dennis had 97¢, and Elena had 110¢. They had to figure out what they could afford to order. While Elena was looking at the menu, she realized that they were using data to solve their problem.

Coco Café Menu	
glass of milk	25¢
iced tea	30¢
hamburger	65¢
French fries	45¢
pizza slice	70¢
cookie	35¢

How do you think Elena and her cousins were using the data on the menu?

_____

_____

Discuss how the children were using the data on the menu.

Using Data to Solve Problems

The children were using the data to figure out which items on the menu they could order.

1. Use the data on the menu to answer these questions and solve the problems. Do your work on a separate piece of paper.

a. Who could afford to order a hamburger, a glass of milk, and a cookie? _____

b. How do you know that? _____

c. Elena ordered an iced tea and a cookie. She could afford one more thing to eat. What was it?

_____

d. How do you know that? _____

_____

e. Dennis ordered a pizza slice. What did he order to drink?

_____

f. Selene ended up spending 140¢. She didn't order a cookie or a pizza slice. What did she order?

_____

2. If you had one dollar to spend, which items would you order on the menu? _____

Lesson 2

Jasper discovered he could use data to solve problems.

Jasper helped his cousin deliver flyers on the weekend in his neighbourhood. He helped her deliver 52 flyers on Saturday and 38 flyers on Sunday.

These are the names of the streets with the number of houses where he had to deliver the flyers.

Shelby Street   32 houses
Rowland Road   27 houses
Park Place   20 houses
Angle Avenue   11 houses

1. Solve these problems. Print the equation and the answers on the lines.

a. Which two streets did Jasper deliver flyers to on Saturday?

_____ + _____ = _____

b. Which two streets did Jasper deliver flyers to on Sunday?

_____

_____ + _____ = _____

c. How many flyers did Jasper deliver in all on the weekend?

_____ + _____ = _____ Jasper delivered ☐ flyers in all.

2. The delivery route was changed one weekend. Jasper was told to deliver the flyers to Shelby Street and Rowland Road on Saturday, and Park Place and Angle Avenue on Sunday. He had to use the data to figure out how many flyers he had to deliver each day. Print the equation and your answer in a sentence on the lines.

a. How many flyers did Jasper deliver on Saturday? _____ + _____ = _____

_____

b. How many flyers did Jasper deliver on Sunday? _____ + _____ = _____

_____

3. Print the equation and the answer on the lines.

Jasper delivered 47 flyers one day. Which streets did he deliver
the flyers to?

_____ + _____ = _____

_____

4. Using the data, make up a problem of your own to solve. Ask
your home instructor to solve it.

_____

_____

5. There are three groups in Elena's bird club—Bluejays, Robins, and Cedar Waxwings. Two of the groups
went on a trip to watch birds. There were 76 children who went in all.
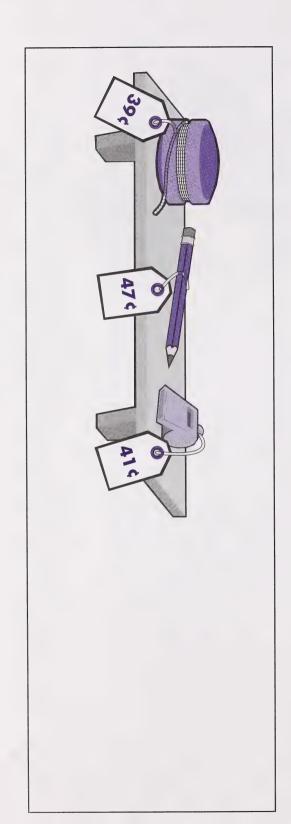
Bluejays—35 children   Robins—41 children   Cedar Waxwings—34 children

The two groups that went on the bird-watching trip were _____
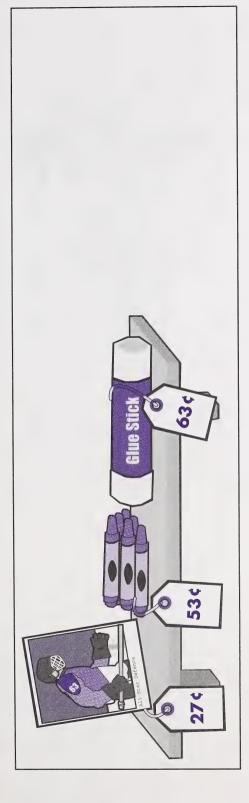
6. Elena was at the dollar store with her mother, her little brother Ivan, and his friend B.J. Her mother asked Elena to help the boys find something to buy with their money. Ivan had 80¢ and B.J. had 75¢. They each wanted to buy many things, but Elena knew they could only buy a few things with the money they had. Elena told the boys which items they could buy.

a. Circle the items on this shelf Ivan could buy if he used all of his money. Show your work.
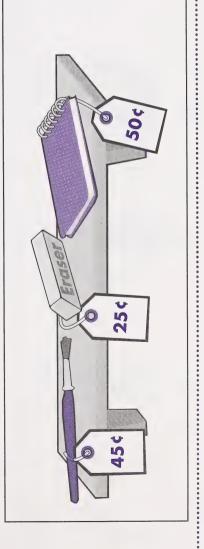
Using Data to Solve Problems

b. Circle the items on this shelf Ivan could buy if he used all of his money. Show your work.

Glue Stick 63 ¢

53 ¢

All Star Defence 63

27 ¢
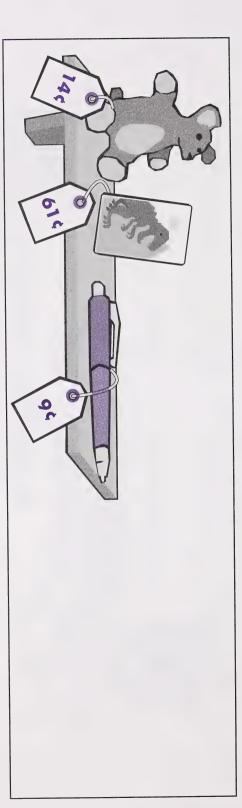
c. Circle the items on this shelf B.J. could buy if he used all of his money. Show your work.

Eraser

50 ¢

25 ¢

45 ¢
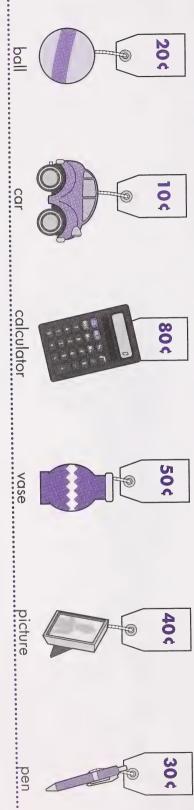
d. Circle the items on this shelf B.J. could buy and still have 5¢ left. Show your work.

| 14¢ | 61¢ | 9¢ |

Lesson 3

Use the data here to solve the problems that follow.

20¢	10¢	80¢	50¢	40¢	30¢
ball	car	calculator	vase	picture	pen

Using Data to Solve Problems

1. Sofie bought two items. She spent 60¢. She did not buy a vase. What did she buy?

_____

2. Alf spent 90¢. He bought three items. One of the items was a pen. What else did he buy?

_____

Use the data and make up four problems of your own. Ask your home instructor to solve them.

- _____

- _____

- _____

- _____

_____

Day 13: Is It Likely?

Every day you talk, read, and hear about things that happen. There are some things that never happen and some things that always happen. Most things happen sometimes.
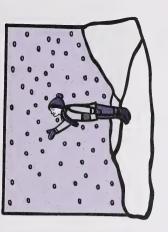
There is a special kind of language that is used to describe the chances of events happening. Today you will begin to explore these words and think about when you should use them.

For example, what are the chances of this book flying up to the ceiling right now?

Lesson 1

Elena was excited. Her mother told her she would take her skiing on the weekend, if it snowed. When Elena woke up on Friday morning, the sky was grey, and she was certain it was going to snow. She ran to her mother and told her they could go skiing after all. Her mother said, "Are you certain it is going to snow, or do you just think it might snow?" "Oh, I am certain it will snow," Elena said.

Elena says she is certain it will snow. **Certain** means she thinks it will snow for sure. There is no doubt in her mind.

Why do you think Elena is so certain it will snow? Tell your home instructor. Did you say it is because she really wants to go skiing? The truth is Elena can't be certain it will snow. She wants it to snow, so that makes her hope it will snow.
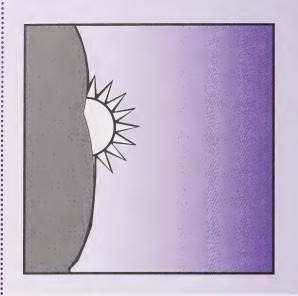
As it turned out, it didn't snow and Elena didn't go skiing. Some things you just can't know for certain!

Can you ever know when something will happen for certain? Tell your home instructor something that happens for certain.

Brainstorm things with the student that happen for certain. These may include the sun rising every day, the seasons occurring every year, people having a birthday every year, and so on.

Brainstorm things that are impossible: being born on February 30, growing ten metres tall, the sun changing direction and rising in the east, and so on.

Some things happen for certain and some things don't. Some things don't happen because it is impossible for them to happen. Things that cannot happen, cannot be done, or don't exist are things that are **impossible**.

Do you think if you dropped a pencil it would float in the air? You know that could never happen. That is impossible. Think of some other things that are impossible. These are things that can't happen, can't be done, or don't exist.

Take two red blocks and two blue blocks from your Math Box. If you don't have coloured blocks, make some. Your home instructor will tell you how.

Put the two red blocks in the bag. If you take one block out of the bag, what colour do you think the block will be?

Did you say red? Why are you so certain it will be red? Tell your home instructor. Did you say red because there are only red blocks in the bag? If you did, you are right! Some things you know for certain.

Is it possible that one of the blocks you take out will be blue? Circle **Yes** or **No**.

Why or why not? Tell your home instructor. If you said it is impossible that one of the blocks will be blue because there are only red blocks in the bag, you are right. Some things you know are impossible.

Name one thing that you know is certain. _____

_____

Name one thing that you know is impossible. _____

_____

Read each of these sentences. Circle **certain** if it will happen. Circle **impossible** if it will not happen. Explain your answers to your home instructor.

1. You will grow to be four metres tall.   certain   impossible

2. The sun will rise in the east.   certain   impossible

3. Elena's friend Lily was born on February 30.   certain   impossible

4. Jasper will live to be 300 years old.   certain   impossible

5. Summer will come after spring.   certain   impossible

Lesson 2

Take one of the red blocks out of the bag you used in Lesson 1. Put a blue block in the bag. You now have one red block and one blue block in the bag. Before you take a block out, are you certain what colour it will be? Circle

Yes   or   **No**.
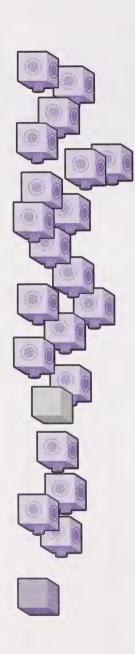
Why or why not? Tell your home instructor. If you said you are not certain because there are two different coloured blocks in the bag, you are right. The block you take out can be either red or blue.

Take out 20 interlocking cubes from your Math Box.

Put the 20 cubes in the bag. You should now have 20 cubes, one red block, and one blue block in the bag.

Without looking, your home instructor will take something out of the bag. Do you think it will be one of the interlocking cubes?

Circle Yes   or   No .

Because there are so many cubes in the bag, it is **likely** that a cube will be the first one out of the bag.

You may not have heard that word before. **Likely** means something could happen. There is a small chance it may not happen, but chances are good that it will.

You cannot be certain the first thing out of the bag will be the cube because there are two blocks in there. But it will likely happen because there are so many more cubes in the bag. The chances are good that the first thing out of the bag will be the cube.

Is It Likely?

Ask your home instructor to take something out of the bag. What was it?

_____

Now that you know what likely means, what do you think the word **unlikely** could mean? Tell your home instructor.

Unlikely means that although something could happen, chances are it won't.

Take the red block out of the bag. Now you should have 20 cubes and one blue block in the bag. Do you think your home instructor will take out the blue block first?

Circle   Yes   or   No .

Do you think it is impossible for the blue block to be taken out first?

No, it is unlikely the first thing out of the bag will be the blue block. There are just too many cubes in there. Chances are the blue block will not be drawn out first.

Circle   Yes   or   No .

It is not impossible because the blue block is in the bag, and it may be the first out. It is unlikely, but not impossible.

Read each of these sentences. Circle **likely** if it could happen. Circle **unlikely** if it may not happen. Explain your answers to your home instructor.

It will snow today.

Circle ❧ **likely** or **unlikely** .

Your parents will give you a bike for your birthday.

Circle ❧ **likely** or **unlikely** .
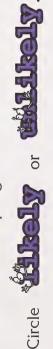
You will see a movie at home this month.

Circle ❧ **likely** or **unlikely** .
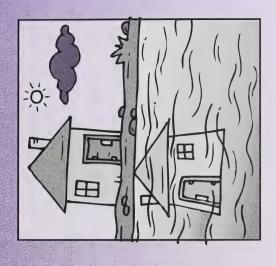
It will rain in the spring.

Circle ❧ **likely** or **unlikely** .

One of your friends will get a dog this year.

Circle ❧ **likely** or **unlikely** .

Review the terms *likely, unlikely, impossible,* and *certain* with the student.

Is It Likely?

Think of events that are likely, unlikely, impossible, and certain to happen. First print two examples on the lines of things that are likely to happen and explain them to your home instructor. Then draw a picture of one of your examples in the box. Continue with unlikely, certain, and impossible.

Examples of Things That Are Likely to Happen

• _____

• _____

Examples of Things That Are Unlikely to Happen

-
-

Is It Likely?

Examples of Things That Are Certain to Happen

- _____

- _____

Examples of Things That Are Impossible

• _____

• _____
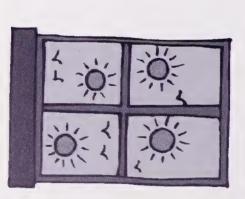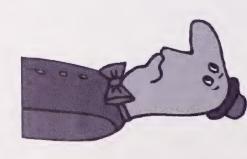
For more practice determining if an outcome is certain or impossible, go to the Extension Activities.

Go to Assignment Booklet 8B.

Day 14: What Can You Expect?

You have probably noticed that it is not much of a problem describing events that always or never happen. It's the events that sometimes happen that need different words to describe them.

Today you will check out some new ways to talk about chance and what you can expect.

Lesson 1
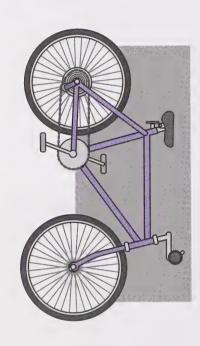
Jasper wanted a bicycle for his next birthday. Elena asked him if he thought he would get one. Jasper replied, "I probably will."

What's another word that is similar to **probably** that you just learned about?

Did you print **likely**? If you did, you are right!

Probably or **probable** means something is likely to happen, although there is a small chance it may not. Jasper thinks he will probably get a bicycle, but he knows that it's not a sure thing.

What Can You Expect?

Think of some things that will probably happen. Print two examples on the lines and explain each one to your home instructor.

- _____

  _____

- _____

  _____

In the box, draw a picture of something that will probably happen.

Lesson 2

Elena also wanted to get a bicycle for the spring. She had asked her parents for a bicycle last month. One day last week, Elena was looking for something in the garage. She saw a brand-new bicycle hidden behind some boxes. She was very excited. When Jasper asked Elena if she thought she would get a bicycle, she said, "Yes, I expect to." Elena was very sure she would get a new bicycle.

When you **expect** something to happen, you can depend on it happening.

What's another word that is similar to expect that you just learned about? _____

Did you print **certain**? If you did, you are right!

Brainstorm things with the student that one can expect will happen.

What Can You Expect?

Think of some things you expect will happen. Print two examples on the lines and explain each one to your home instructor.

- _____

- _____

In the box, draw a picture of something that you expect to happen.

Lesson 3

Why do you think you say things are likely, unlikely, or probable? Talk about this with your home instructor.

When you say it will probably rain tomorrow, you know that it might change. If you didn't know that the weather is changeable, you would say it is certain to rain, or you expect it to rain. You have seen weather change from one day to the next.

Have you ever thought it would be sunny the next day, only to have it rain? Things like that happen all the time. You can never be certain about the weather. That's why people say it will likely be sunny or it will probably be sunny.

Discuss why things may change that are likely, unlikely, or probable.

What Can You Expect?

Can you say for certain that you will have a math class next Tuesday? Circle **Yes** or **No**.

No, you can't. Even though you think it is likely to happen, schedules sometimes have to be changed for many reasons. Someone may get sick, or something else may come up.

When you say something is unlikely to happen, sometimes you can be surprised and it does happen. This has probably happened to you. Can you think of something that happened to you that you thought was unlikely to happen? Did you ever receive something you thought unlikely to get? Tell your home instructor about it.

Sort the following sentences by printing the number of each sentence in the correct box.

It probably will happen.	I expect it to happen.

1. Birds will fly south in the fall.

2. You will have a math class sometime in the next month.

3. You will see some clouds tomorrow.

4. If you drop a coin in a glass of water, it will sink.

5. There will be hot days in the summer.

6. You will read something sometime today.

7. You will watch TV this weekend.

8. You will see your home instructor sometime next week.

9. The sun will set tonight.

10. You will travel somewhere during summer vacation.

For more practice determining the likelihood of an outcome, go to the Extension Activities.

Go to Assignment Booklet 8B.

Day 15: What Might Happen?

Today you will further explore chance by playing some games.

A coin, a paper or plastic cup, a die, and the letters of the alphabet will help you do your explorations.

Turn the page to see what might happen!

Lesson 1

Elena and Jasper were having fun talking about things that were likely, probable, unlikely, certain, expected, or impossible to happen.

They decided to conduct a few experiments to see if they could predict the chances of things happening. Their home instructor helped them set up some experiments.

You will do the same experiments Jasper and Elena did.

Get a coin from your Math Box.

What Might Happen?

The first experiment is with a coin. Here are four outcomes that might happen if you flip a coin.

- It lands heads up.
- It lands on edge.
- It lands tails up.
- It floats in the air.

Which of these four events do you think is certain to happen?

_____

Which of these is unlikely to happen?

_____

Which of the four events is impossible?

_____

Conduct the experiment with your coin. Flip it 20 times. Keep a tally of the results in the box.

Have the student flip a coin 20 times and make a tally mark beside the event that happened.

landed heads up	
landed tails up	
landed on its edge	
floated in the air	

Count your tally marks. How many times did the coin land heads up?

How many times did the coin land tails up?
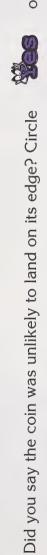
How many times did the coin land on its edge?

How many times did the coin float in the air?

What Might Happen?

Look at what you predicted would happen.

Did you say the coin was certain to land either heads up or tails up? Circle **yes** or **no**.

If you said yes, you are correct!

Did you say the coin was unlikely to land on its edge? Circle **yes** or **no**.
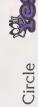
You are right if you said no. Until you did the experiment, you might not have been sure if the coin would land on its edge. That's why you may have said it was unlikely.

Did you say it was impossible for the coin to float in the air?

Circle **yes** or **no**.

It is impossible. You knew that coins can't float in the air even before you did the experiment. You were sure of how that one would turn out.

Get a paper cup from your Math Box.

The second experiment is with a cup. Look at the five outcomes that might happen if you toss a cup.

- It lands on its top.
- It lands on its edge.
- It lands on its bottom.
- It floats in the air.
- It lands on its side.

Which of these events do you expect to happen?

_____

Which of these events is likely to happen?

_____

Which of these events is unlikely to happen?

_____

Which of these events is impossible?

_____

What Might Happen?

Conduct the experiment with your cup. Toss it 20 times. Keep a tally of the results in the box.

Have the student toss the cup 20 times and make a tally mark beside the event that happened.

landed on its top	
landed on its bottom	
landed on its side	
landed on its edge	
floated in the air	

Count your tally marks.
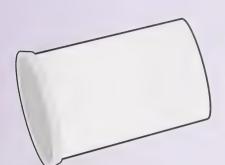
How many times did the cup land on its top?

How many times did the cup land on its bottom?

How many times did the cup land on its side?

How many times did the cup land on its edge?

How many times did the cup float in the air?

Look at what you predicted would happen. Did you say you expected the cup to land on its side?

Circle **yes** or **no**.

Did you say the cup was likely or unlikely to land on its top or bottom?

If you said yes, you are correct!

Circle **Likely** or **unlikely**.

You may not have been sure about that. Now that you have conducted the experiment, you know that it is likely for a paper or plastic cup to land on its top or bottom.

Did you say it was impossible for the cup to land on its edge? Circle **yes** or **no**.

What Might Happen?
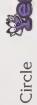
The cup can't land on its edge, just as the coin can't. You may not have been sure about that before the experiment though, but you know now.

Did you say it is impossible for the cup to float in the air?

Circle **yes** or **no**.

You probably knew that it can't. It is impossible for a cup to float in the air, just as a coin can't float in the air.

You may not have got all the answers right, but that's why you do experiments. They help you learn new things. These are things you will always know.

Lesson 2

Take a die out of your Math Box.

Jasper and Elena were playing Snakes and Ladders. Elena needed to roll a six with her die to win. She wondered what the chances were that she would roll a six.

Do you think it is likely, unlikely, certain, or impossible that Elena will roll a six with one try?

You know it is not impossible because Elena could roll a six. You know it is not certain, because any of the other numbers could come up. It is not likely she will roll a six because there are too many other numbers that could come up. You could say it was likely if there were more sixes on the die, but there is only one.

So the correct answer is unlikely. It is unlikely Elena will roll a six. Although it may happen, chances are that another of the five numbers will be rolled.

Try it now with your die. Roll it once and see what happens.

Did you roll a six with one try?

Circle　**yes**　or　**no** .

Did you expect the number that you rolled?

Circle　**yes**　or　**no** .

What Might Happen?

You will now conduct an experiment with your die by rolling it 20 times. Before you begin, make predictions about what will happen.

1. Is it likely that you will roll a four? Circle **yes** or **no**.

2. Do you expect to roll a two? Circle **yes** or **no**.

3. Will you roll a seven? Circle **probable** or **impossible**.

4. Are you certain that you will roll a one? Circle **yes** or **no**.

5. Will you roll 15 fives? Circle **likely** or **unlikely**.

6. Will you probably roll a three? Circle **yes** or **no**.

7. Will most of the numbers be greater than one? Circle **likely** or **unlikely**.

8. Is it probable that most of the numbers you roll will be less that six? Circle **yes** or **no**.

Roll a die 20 times and record the data on the chart.
Put a tally mark beside the number that you rolled.

Count the tally marks beside each number.

1	
2	
3	
4	
5	
6	

How many times did you roll a one?

How many times did you roll a two?

How many times did you roll a three?

How many times did you roll a four?

How many times did you roll a five?

How many times did you roll a six?

Look back at your predictions to see how many were correct.

What Might Happen?

Lesson 3

Take the letters of the alphabet out of your Student Folder.

You just saw your home instructor place all 26 letters of the alphabet into a bag and shake them up. See if you remember the alphabet. Print the letters of the alphabet on the lines.

Put the letters of the alphabet into a bag and shake them up.

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

1. Which of the letters are vowels?

_____ _____ _____ _____ _____

_____ _____

2. How many vowels are there?

Did you say five? You are right!

Do you know what a consonant is?

Circle   **yes**   or   **no** .

A consonant is a letter that is not a vowel.
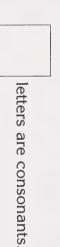
3. If there are 26 letters in the alphabet, and five of them are vowels, how many are consonants?

Show your work here.

_____ = _____

letters are consonants.

Did you say there are 21 consonants in the alphabet? You are right!

Ensure the student subtracts 5 from 26 and shows his or her work.

What Might Happen?

Ensure the student does not see the letters he or she pulled out of the bag. Place them out of the student's sight.

Without looking at them, pull five letters out of the bag. Give them to your home instructor. Remember, no peeking! You're not to see what the letters are until you are told you can look.

4. Now that you have pulled five letters out of the bag, answer the following questions about them.

a. Is it likely, unlikely, probable, certain, or impossible that all the letters are the five vowels?

_____

b. Do you expect to see a consonant?

Circle **yes** or **No** .

c. Is it likely that one of the letters is a vowel?

Circle **yes** or **No** .

d. Is it certain that one or more of the letters is a vowel?

Circle **yes** or **No** .

e. Is it likely that one or more letters are not vowels? Circle **yes** or **no**.

f. Are you certain that one of the letters is z? Circle **yes** or **no**.

g. Is it likely or unlikely that all the letters are consonants?

Circle **likely** or **unlikely**.

h. Is it probable that at least one of the letters is a consonant? Circle **yes** or **no**.

i. Do you think it is impossible for three of the letters to be a, b, and c? Circle **yes** or **no**.

j. Do you expect to see a vowel? Circle **yes** or **no**.

After you have answered all the questions, look at the five letters you pulled out of the bag. Were your predictions accurate?

Circle **yes** or **no**.

Day 15

Before you pull another letter out of the bag, do you think it is likely or unlikely to be a vowel?

Circle **likely** or **unlikely**.

Keep pulling letters out of the bag until they are all pulled. Each time you are about to pull a letter out, predict whether it is likely to be a vowel or not.

How did you do with your predictions? Were they accurate?

Circle **yes** or **no**.

You now have a better idea of when things are likely or unlikely to happen.

Have the student predict each letter before pulling. The student will begin to see that as more letters are pulled, the probability of vowels appearing changes with each pull.

Day 16: Give It a Spin

Do you remember what a spinner is? It can be used to play games.

A spinner can also be used to check out possibility. Different spinners give different results.

With practice you will soon be able to make predictions about what will happen when you spin a certain spinner.

Are you ready to give it a spin?

Give It a Spin

Lesson 1
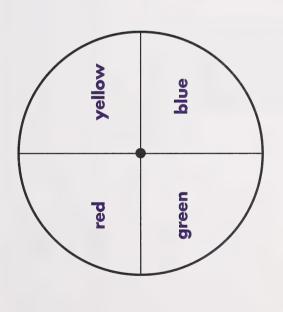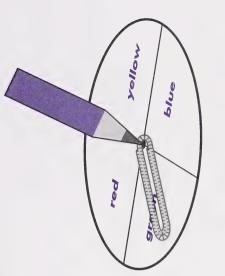
Jasper was looking in his game drawer for a game to play with Elena. He found a spinner. He asked Elena what she thought they could do with it. Elena said they could keep a tally of how often the spinner stopped on each colour.

You try it. First, colour the sections of the spinner red, yellow, green, and blue.

To spin, use a paper clip and a pencil. Place the pencil with its tip in the centre of the spinner. Then spin the paper clip.

Give It a Spin

You are going to spin the spinner (the paper clip) 20 times. Predict what you think will happen.

1. Is it likely that the spinner will stop on red only? Circle   **yes**   or   **no** .

2. Will the spinner stop on green and yellow only? Circle   **likely**   or   **unlikely** .

3. Do you expect the spinner to stop on all four colours at least once? Circle   **yes**   or   **no** .

4. Are you certain that the spinner will stop on each colour five times? Circle   **yes**   or   **no** .

5. Which colour do you think the spinner is likely to stop on the most? _____

Spin the spinner 20 times. Keep a tally of the spins. Print a tally mark beside the colour the spinner landed on after each spin.

Count the tally marks for each colour. Put the totals in the boxes on the right.

red	
blue	
yellow	
green	

Give It a Spin

Discuss the student's predictions and how accurate they were. If they were not accurate, review the terms *likely, unlikely, certain,* and *expect* with the student. Then go over the questions again.

Discuss the probability of the spinner landing on the four colours the same way as before. The spinner should land on the four colours about the same number of times.

Look back at your predictions. Were your predictions accurate?

Circle   Yes   or   No   .

If you were to spin the spinner 20 more times, what do you think will likely happen? Why? Tell your home instructor what you think.

Try it again to see if what you think will happen is true.

Keep a tally of the colours you spin.

red		
blue		
yellow		
green		

The student may say the spinner stopped on each colour about the same number of times as before.

Total the tally marks for each colour. Put the totals in the boxes on the right. Compare them with the first series of spins. What happened?

_____

_____

Did the spinner stop on each colour about the same number of times?
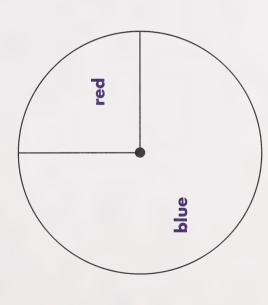
Circle **Yes** or **No**. If it did, your prediction was accurate.

Lesson 2

You saw what happened with the spinner in Lesson 1. Here's another spinner. It's a little different. Colour the sections of this spinner red and blue. Tell your home instructor how it is different from the other spinner.

red

blue
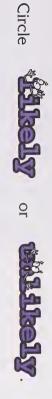
With this spinner, which colour is the spinner more likely to stop on?

_____　Why? _____

_____

Give It a Spin

You will spin the spinner 20 times. Predict what you think will happen.

1. Will the spinner stop on red only?

Circle **Likely** or **unlikely** .

2. Will the spinner stop on blue only?

Circle **likely** or **unlikely** .

3. Are you certain that the spinner will stop on blue more often?

Circle **Yes** or **No** .

4. Do you expect the spinner to stop on blue more often?

Circle **Yes** or **No** .

Spin the spinner 20 times. Keep a tally of the spins.

red	
blue	

Count the tally marks. Enter the totals in the boxes on the right.

Look back at your predictions. Were your predictions accurate?

Circle **Yes** or **No**.

If you were to spin the spinner 20 more times, what do you think will likely happen? Why? Tell your home instructor what you think.
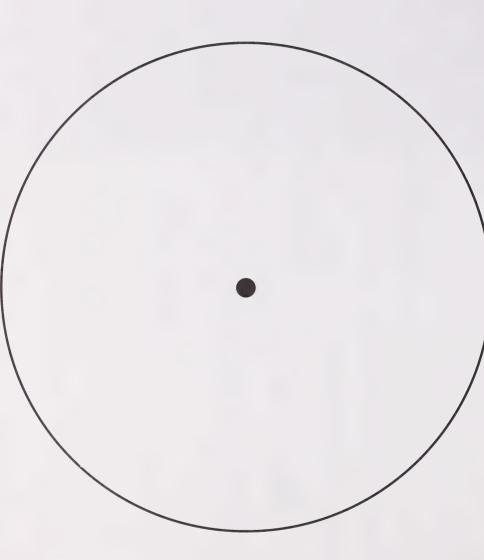
Take your ruler out of your Math Box.

Discuss the student's predictions and how accurate they were. If they were not accurate, review the terms *likely*, *unlikely*, *certain*, and *expected* with the student and go over the questions again.

Discuss the probability of the spinner landing on the two colours the same way as before. The spinner should land on blue more often than on red.

Design your own spinner. You can divide it into two, three, or four parts. Use your ruler to make straight lines. Colour each section a different colour.

Day 16

Give It a Spin

Describe your spinner.

_____

Predict how often the spinner will stop on the colours. Is it more likely to stop on one colour than another? Is it likely or unlikely to stop on all colours the same number of times?

Print your predictions on the lines. _____

_____

Now get spinning!

Keep a tally of the spins on a separate sheet of paper. After you have recorded 20 spins, predict whether the same thing will happen if you record another 20 spins.

For more practice using spinners and making predictions, go to the Extension Activities.

Go to Assigment Booklet 8B.

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Day 17: Spinning Fun

Yesterday you used coloured spinners to make predictions.

Today you are in for more spinning fun.

You will begin with number spinners. Will they be different from the coloured spinners or will they work the same?
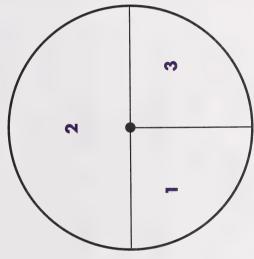
Then you will use an egg carton and your tossing arm to do an experiment.

What will be the results?

Lesson 1

Elena and Jasper asked their home instructor to give them a few more spinners to work with. This is the first one their home instructor showed them.

This is a numbers spinner. If you were to spin the spinner, where do you think it would likely stop more often? _____

If you said on the two, you are right! Colour the space for each number a different colour. Why do you think it would stop on the two more often?

_____

Spinning Fun

Talk about the space the two covers and the chances the spinner will stop there more often. Have the student colour each area a different colour to reinforce the concept.

You can see the 2 covers more space than the 1 or the 3. The spinner will likely stop there more often.

You are going to spin the spinner ten times. Before you do, answer the questions.

1. Do you expect the spinner to stop more often on the 2?

   Circle **Yes** or **No**.

2. Are you certain that the spinner will stop on the 2 more often?

   Circle **Yes** or **No**.

3. Is the spinner likely to stop on the 1 and 3 the same number of times? Circle **Yes** or **No**.

Tally the results of ten spins on the chart. Enter the totals in the boxes on the right.

1	
2	
3	

Spinning Fun

Look back at your predictions. Were your predictions accurate?

Circle **Yes** or **No** .

If you were to spin the spinner 10 more times, what do you think would likely happen? Why? Tell your home instructor what you think. Try the experiment again.

What happened?

_____

_____

Was your prediction accurate? Circle **Yes** or **No** .

Jasper made a graph of the data he and Elena recorded. They presented and explained the data to their home instructor.
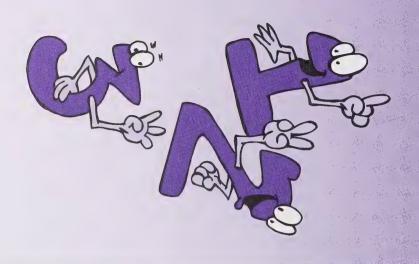
Discuss the student's predictions and how accurate they were. If they were not accurate, review the terms *likely, unlikely, certain,* and *expect* with the student; then go over the questions again.

Discuss the probability of the spinner landing on the three numbers the same way as before. The spinner should land on the three numbers about the same number of times as the first time. Have the student repeat the experiment.
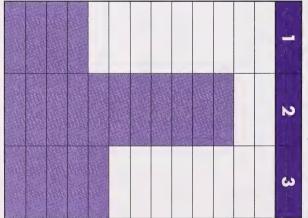
Have the student explain what the graph shows: that the spinner stopped more often on 2.

Look at Jasper and Elena's graph.
Tell your home instructor what the graph shows.
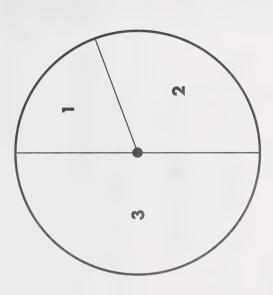
Spins on the Spinner

1	2	3

Spinning Fun

Lesson 2

This is the second spinner Jasper and Elena's home instructor showed them.

1. a. This is a numbers spinner, too. How is it different from the first one?

_____

_____

Spinning Fun

Talk about the area the 3 covers and how chances are the spinner will stop there more often. Have the student colour each area a different colour to reinforce the concept.

---

b. Where is the spinner more likely to stop? _____ Why? _____

_____

2. You are going to spin the spinner ten times. Answer these questions first.

a. Will the spinner stop most often on the 2?

Circle **likely** or **unlikely** .

b. Do you expect the spinner to stop more often on the 3?

Circle **yes** or **no** .

c. Are you certain that the spinner will stop on the 3 more often?

Circle **yes** or **no** .

Now spin the spinner ten times.

Tally the ten spins on the chart.

1		
2		
3		

Look back at your predictions. Were your predictions accurate?

Circle **yes** or **no**.

If you were to spin the spinner ten more times, what do you think will likely happen? Why? Tell your home instructor what you think. Try the experiment again.

What happened?

_____

_____

Discuss the student's predictions and how accurate they were. If they were not accurate, review the terms *likely, unlikely, certain,* and *expect* with the student; then go over the questions again.

Discuss the probability of the spinner landing on the three numbers the same way as before. The spinner should land on the three numbers about the same number of times as the first time. Have the student repeat the experiment.

Was your prediction accurate? Circle **Yes** or **No**.

Make a graph of the data you recorded. Use the data from the first experiment. Present and explain it to your home instructor. Remember to give the graph a title.

Lesson 3

Try this fun game.

Take out the egg carton and 26 counters from your Math Box.

Colour two cups in the carton blue, two cups red, and eight cups green. Colour them in any order you like. If you can't colour the egg carton, print the words **blue**, **red**, and **green** on the cups.

Stand about 30 cm back from the egg carton. Toss one counter at a time at it. When you have finished, record the results on the chart. Then make a graph of the data.

Before you begin, answer the questions.

1. What colour do you think the counters will likely land in most often? _____

2. Do you expect the blue cups to have as many counters as the green cups?

   Circle   **yes**   or   **no** .

3. Will the blue cups have the same number of counters as the red cups?

   Circle   **likely**   or   **unlikely** .

Record the tosses in the chart.

red				
blue				
green				

Count the results. Put the totals in the boxes on the right.

Look back at your predictions. Were your predictions accurate?

Circle 🐸 **yes** or 🐮 **no**.

Discuss the student's predictions and how accurate they were. If they were not accurate, review the terms *likely, unlikely, certain,* and *expect* with the student, and go over the questions again.

If you were to repeat this experiment, what do you think will likely happen? Why? Tell your home instructor what you think. Try the experiment again.

Have the student make the graph and then tell you what the data shows.
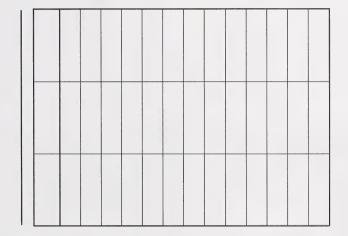
Spinning Fun

Make a graph of the data you recorded. Present and explain it to your home instructor. Remember to give the graph a title and to name the colours.

Day 18: What Do I Know Now?

You've worked hard and you've done an excellent job! It's time again to check and see what you remember.

You started this module by learning about data. How do you collect it, record it, show it? You saw that data can help you solve problems.

Experiments with spinners were fun. What did you learn from spinning? It's time to check and see what you know.

What Do I Know Now?

This is a review of what you learned in Module 8. See how much you remember.

1. What are three ways of collecting data?

_____

_____

2. What are three ways of recording data?

_____

_____

3. What are three ways of presenting data? Name the three types of graphs you learned about.

_____

_____

4. Look at the graph. Answer the questions on the lines.

Shivaun's Friends' Favourite Ice Cream Flavours

chocolate-mint	🍦 🍦 🍦 🍦 🍦 🍦 🍦 🍦 🍦 🍦 🍦
cherry	🍦 🍦 🍦 🍦 🍦 🍦 🍦 🍦 🍦
vanilla	🍦 🍦 🍦 🍦 🍦 🍦 🍦
butterscotch	🍦 🍦 🍦

a. What information does the graph give you? _____

_____

b. What is the most favourite ice cream flavour? _____

c. What is the least favourite ice cream flavour? _____

d. How many people like vanilla? ☐

e. How many people like chocolate-mint? ☐

What Do I Know Now?

f. How many people were surveyed? [ ]

How do you know that? _____

_____

5. Look at the graph.

What Christopher's Friends Had for Lunch

Sandwich	Carrot Sticks	Chocolate Milk	Juice	Soup	Granola Bar

Think of four questions you can ask a friend about this graph and print them on the lines.

• _____

_____

• _____

_____

• _____

_____

• _____

_____

What Do I Know Now?

6. Jamal counted the number of vehicles that drove by his house in one afternoon. He recorded the number with tally marks.

cars	＃＃＃ ＃＃＃			
pick-up trucks	＃＃＃				
vans	＃＃＃
transport trucks	＃＃＃		

Make a bar graph of the data he recorded. Print a title for your graph. Print the names of the vehicles beside the rows.

_____

Answer the questions about the data on the lines.

a. What does the data tell you? _____

_____

b. Which type of vehicle drove by his house most often? _____

_____

c. How many more pick-up trucks drove by than vans?

☐

7. Print three more questions you can ask about the graph.

• _____

_____

• _____

_____

• _____

_____

8. Look at the spinner. Then answers the questions.

a. Which colour is the spinner most likely to stop on? _____

Why? _____

b. Do you expect the spinner to stop on white about the same number of times as on grey?

Circle   **Yes**   or   **No** .

c. With a pencil and paper clip, spin the spinner 20 times. Keep a record of the spins in the chart.

purple		
white		
grey		

What does your experiment show? _____

_____

d. If you record another 20 spins, what do you think will likely

happen? _____

_____

Make a graph of the data you recorded. Present and explain it to your
home instructor. Remember to give the graph a title.

purple										
white										
grey										

Have the student make the graph and then
tell you what the data shows.

Congratulations

You have now completed Module 8: What Does the Data Show? You collected and used data to make graphs. You used new words to talk about what may or may not happen.

These are the things you learned:

- how to collect data
- how to record data
- how to use tally marks
- how to organize data using charts, lists, and pictures
- how to make object graphs, picture graphs, and bar graphs
- how to talk about the data a graph shows
- how to make new questions about the data
- how to tell whether an event is likely, unlikely, certain, or impossible to happen
- how to predict if something is going to happen during an experiment

These are skills you will be using for the rest of your life.

Extension Activities

Days 6 to 12

Take the graph paper out of your Student Folder.

Make five new graphs, using different data every time. You will see two types of graph paper. For each graph choose the type of graph paper that best fits your data.

Gather information for any topic you choose. Collect the information by counting, measuring, or surveying. Use tally marks or check marks to count. Make a chart or a list or draw a picture to organize the data. Make an object graph, a bar graph, or a picture graph to show your data. Think of questions you can ask about your graph. Present the graph to your home instructor.

Day 13

Activity 1

Take a sheet of paper out of your Student Folder.

Fold the paper in half. On one side of the fold print, "These are events that are certain to happen." On the other side print, "These are events that are impossible to happen." Now write down some events under each heading.

Extension Activities

Activity 2

Take several sheets of paper out of your Student Folder.

Draw pictures of each of the events you wrote about in Activity 1, and write a sentence about each of them.

Days 14 and 15

Activity 1

Take a sheet of paper out of your Student Folder.

Fold the paper in half. On one side print, "These are events that are likely to happen." On the other side print, "These are events that are unlikely to happen." Now write down some events under each heading.

Activity 2

Take several sheets of paper out of your Student Folder.

Draw pictures of each of the events you wrote about in Activity 1, and write a sentence about each of them.

Extension Activities

Activity 3

Take a sheet of paper out of your Student Folder.

Fold the paper in half. On one side print, "These are events that will probably happen." On the other side print, "These are events that I expect will happen." Now write down some events under each heading.

Activity 4

Take several sheets of paper out of your Student Folder.

Draw pictures of each of the events you wrote about in Activity 3, and write a sentence about each of them.

Days 16 to 18

Take four sheets of paper out of your Student Folder.
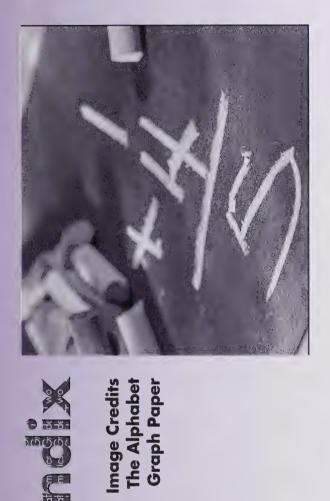
Take your crayons, a pencil, and a paper clip out of your Math Box.

Extension Activities

Draw and colour each of these different spinners. You can trace a circle from the spinner you used in Day 16 on page 162.

- one that is more likely to stop on purple than pink
- one that will probably stop on all four colours the same amount of time
- one that you expect will stop on yellow as often as it stops on green
- one that you expect to stop on blue more often than red

Appendix

Image Credits
The Alphabet
Graph Paper

Appendix

Image Credits

Welcome page: EyeWire, Inc.

The Alphabet

A B C D E F G

H I J K L M N

O P Q R S T U

V W X Y Z

Graph Paper